Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

DA status report 2019 – Slovenia

Benedikt Strajnar

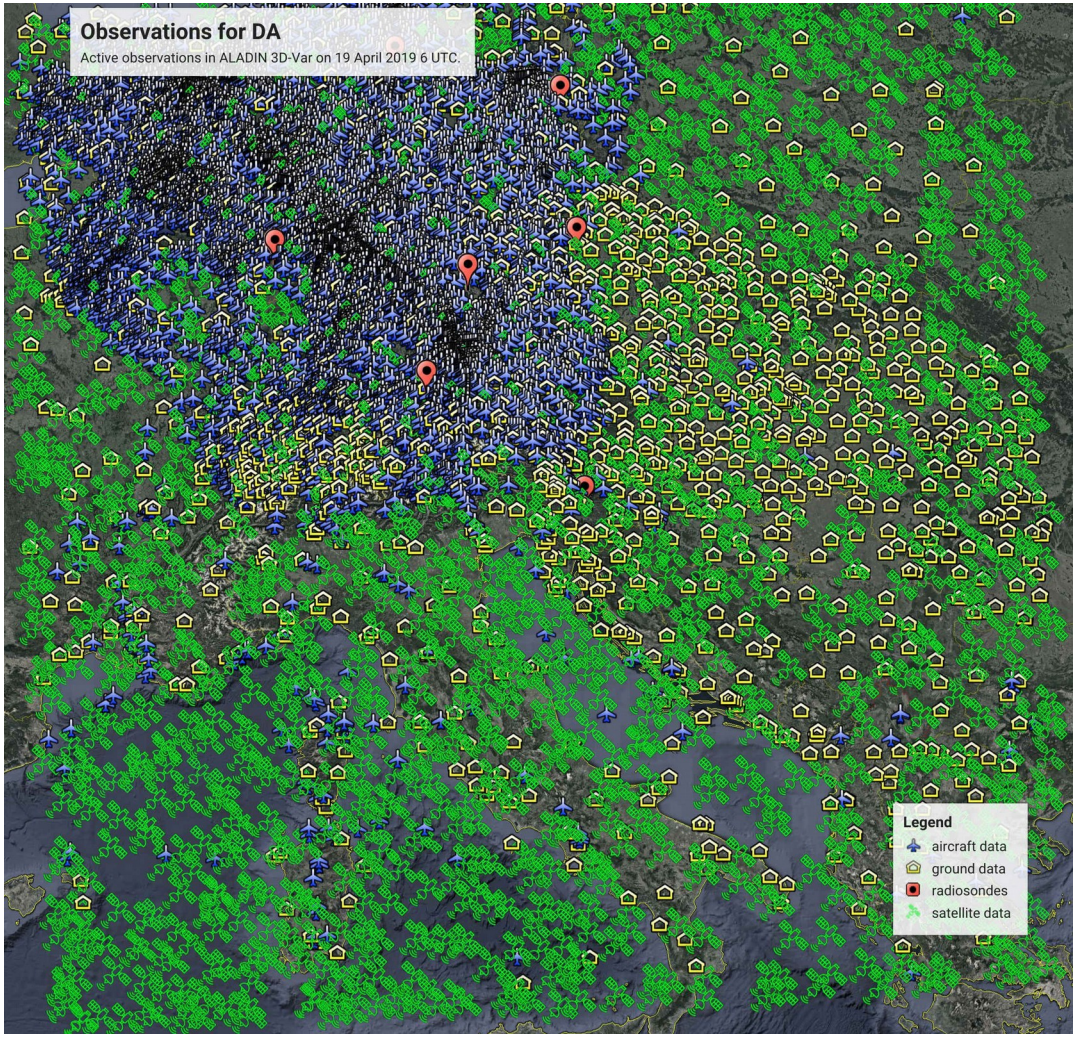
DHMZ SHMU ARSO METEO Slovenia OMSZ ZAMG ROMANIA ANM

Outline

- Status slide
- Migration to cy43
- Recent observation impact studies
  - ZTD observations (local, E-GVAP)
  - Surface wind
  - Reflectivity (OPERA) – separate talk
- EDA experimentation
- Other R&D topics
- Conclusions

Current NWP system

- Model: ALARO-v1B cy43t2 (since May 2019)
- 4.4 km, 87L, 432x432
- Timestep: 180 s
- Coupling: ECMWF (6h lag), 1h/3h
- Space-consistent LBC, no init
- 72h/36h forecasts
- Upper-air DA: 3h 3D-Var, static ENS DSC B matrix,
- SYNOP (t,rh), AMDAR (u,v,q), Mode-S EHS/SI-MRAR (u,v), CZ-MRAR (u,v), GEOWIND/HRWIND(u,v), TEMP(u,v,t,q), PROFILER (u,v), SEVIRI(2,3), AMSU-A(5-12), MHS(3-5), IASI(~), ASCAT(u,v)
- VarBC (sat.), REDNMC=1.6, SIGMAO_COEF=0.9
- Surface DA: OI-CANARI, SYNOP(t,rh)
- SST analysis from ECMWF

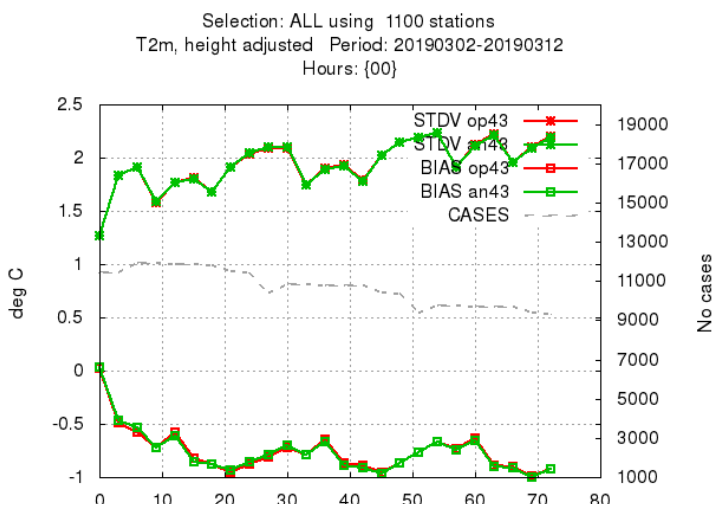


Upgrade to cy43t2

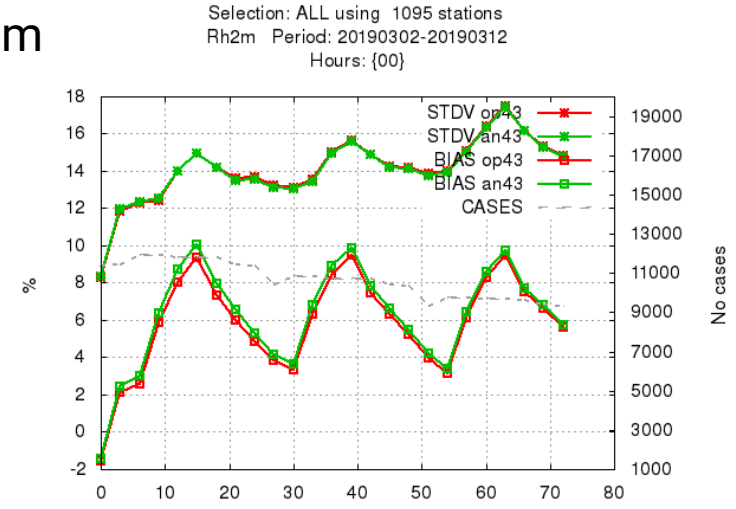
- Same observation data set
- Small technical updates
  - update of ALARO-1vB package
  - Use of OpenMP to slightly improve performance (overall 20%)
  - Migration to ecFlow/4.14
- Verified integration and assimilation cycle “separately”

Assimilation cy43 vs. cy40 - scores

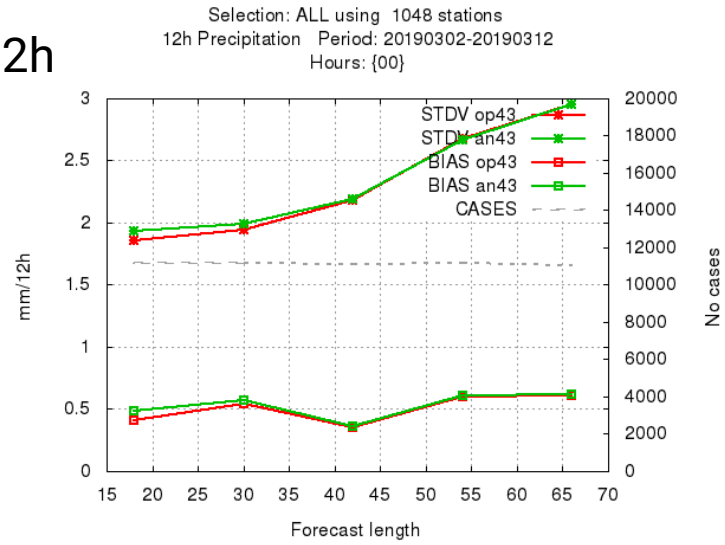
T2m



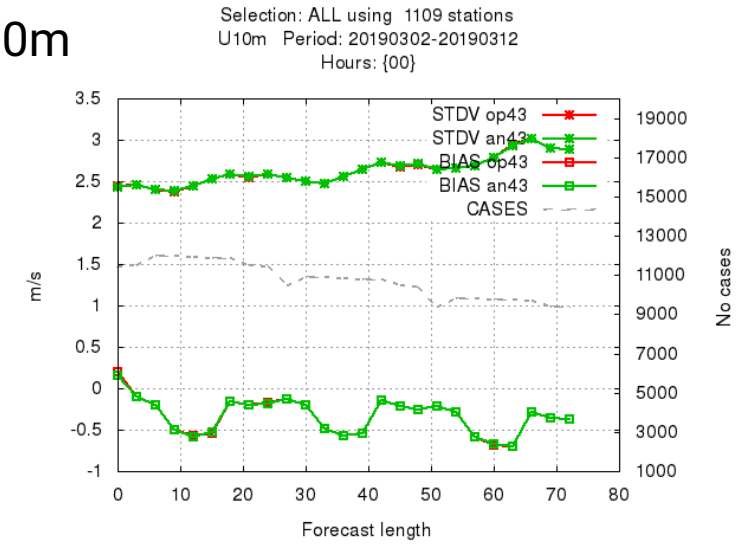
RH2m



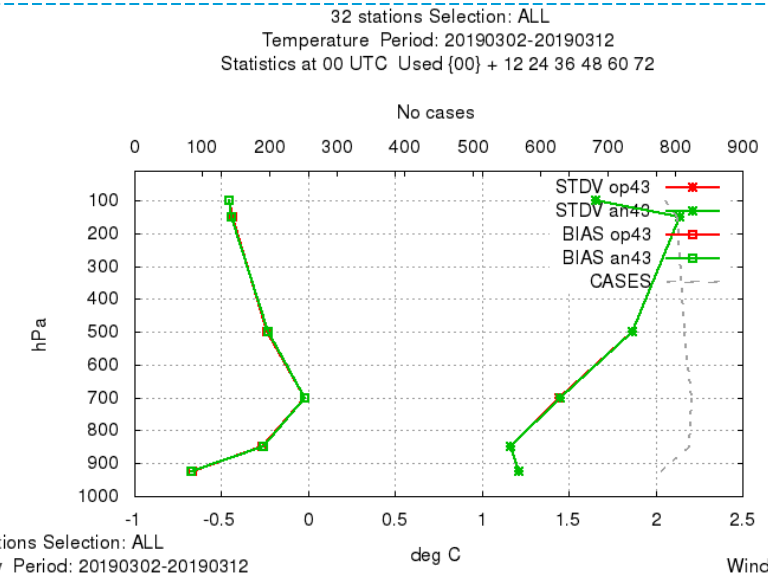
TP 12h

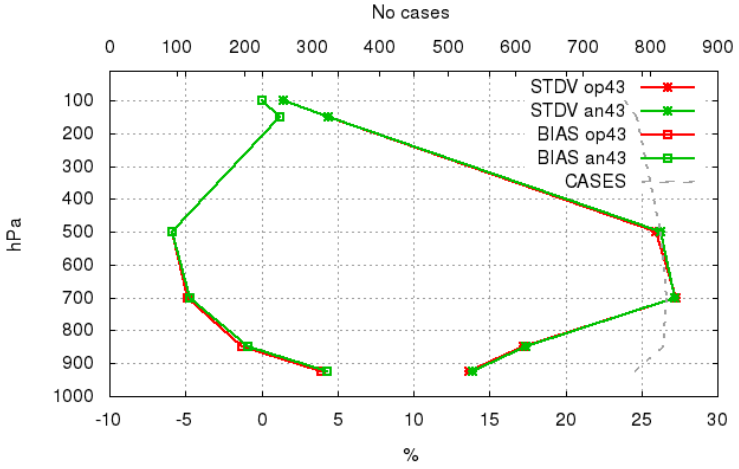


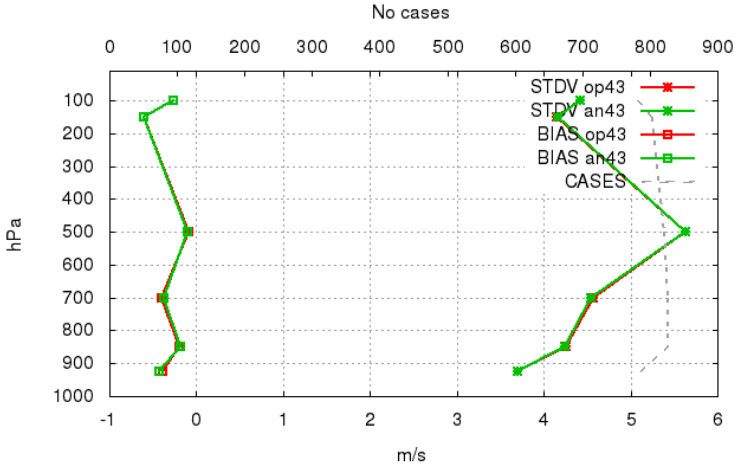
U10m



Assimilation cy43 vs. cy40 – scores (2)

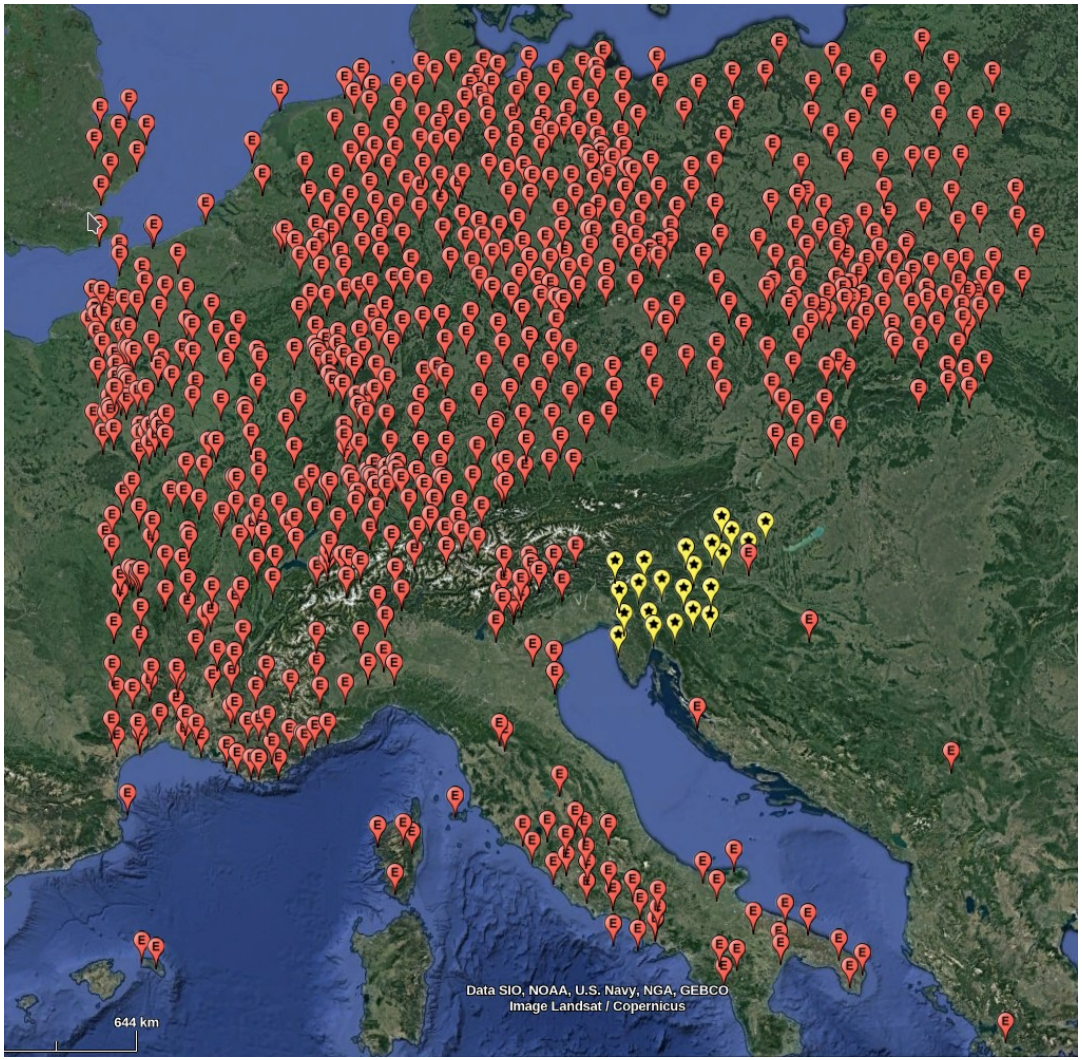






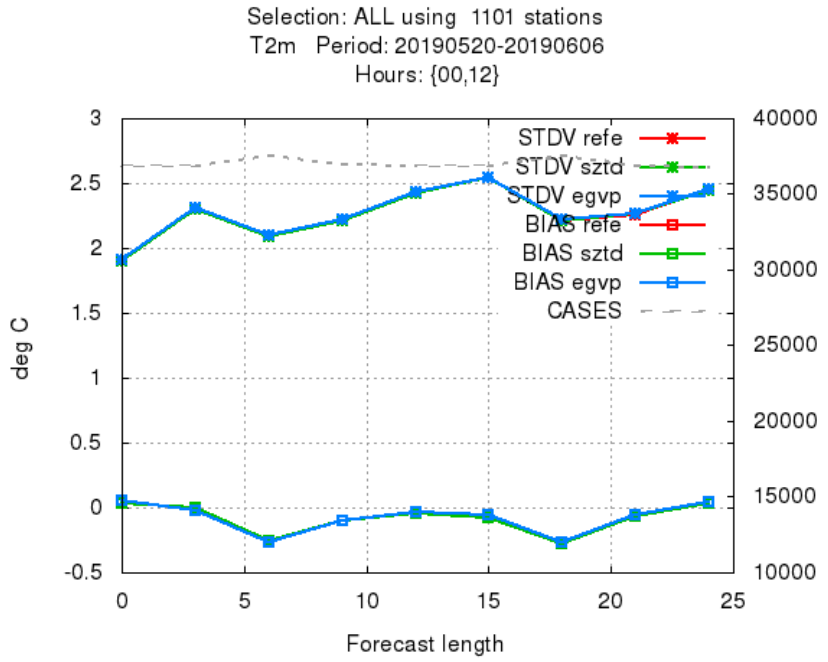
OSE - assimilation of GNSS-ZTD

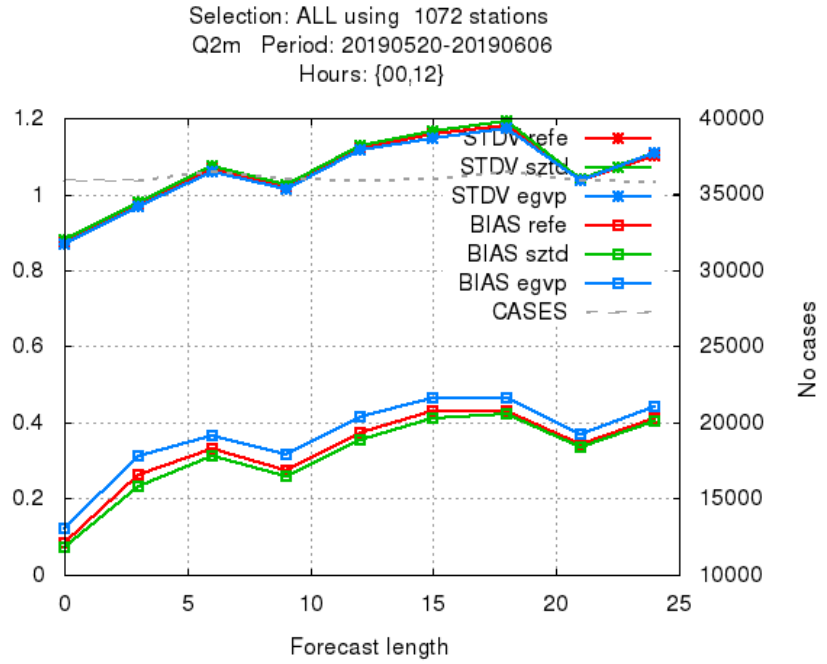
- 15-day period
- 2 networks
  - Slovenian data (SIGNAL) – 25 stations
  - E-GVAP data (data with oper. status only)
  - 15 - day experiment (reference, SIGNAL, E-GVAP)



OSE – impact of GNSS-ZTD (2)

- E-GVAP assimilation increases T and RH bias, but has small positive impact on standard deviation.

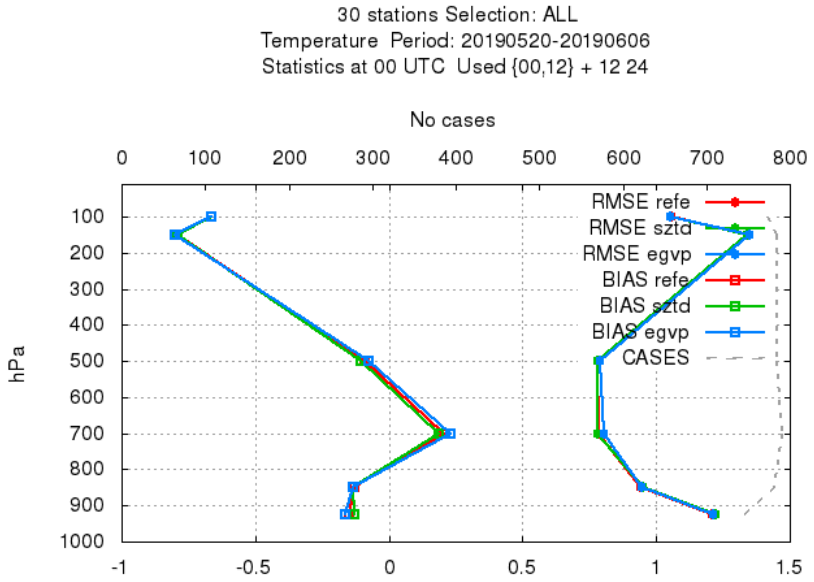


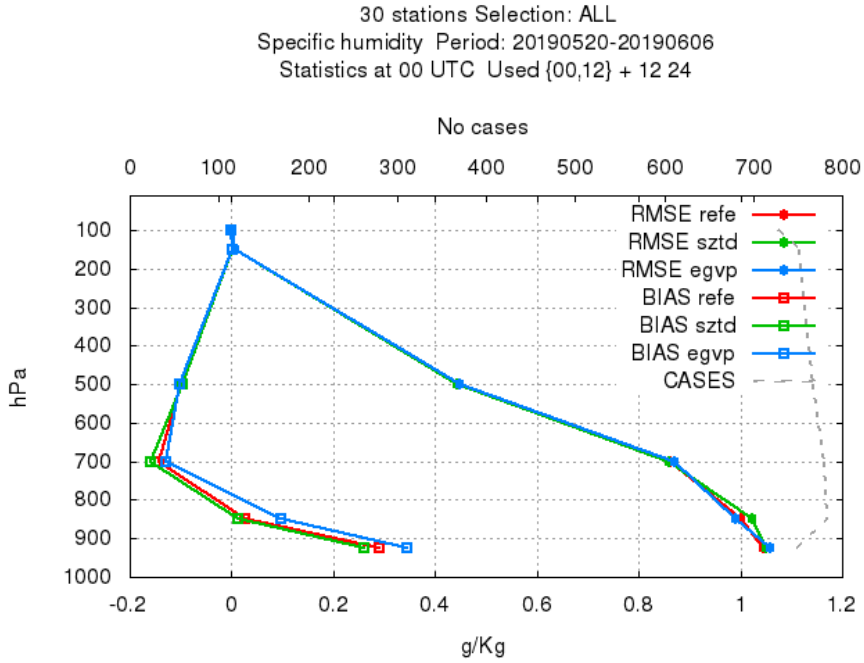


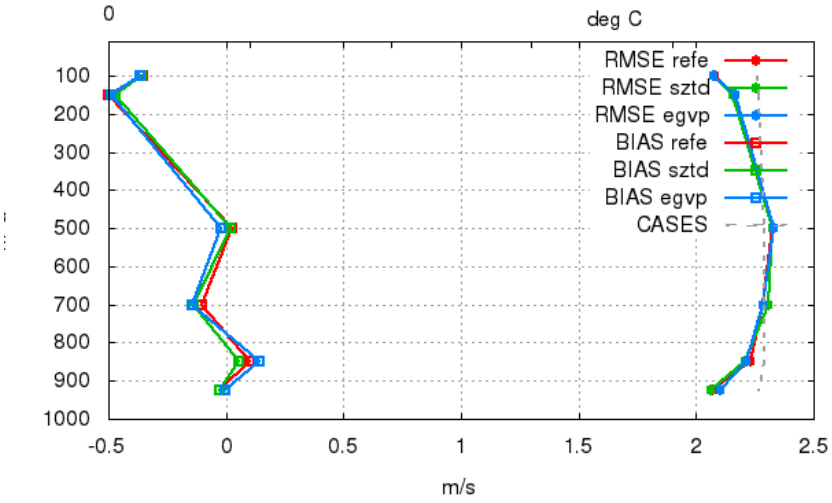
Opposite bias in SIGNAL and E-GVAP data sets.

OSE - Impact of GPS-ZTD (2)

- Upper-air scores: E-GVAP causes moistening, SIGNAL cause drying.
- A study of SIGNAL quality (at provider) is ongoing



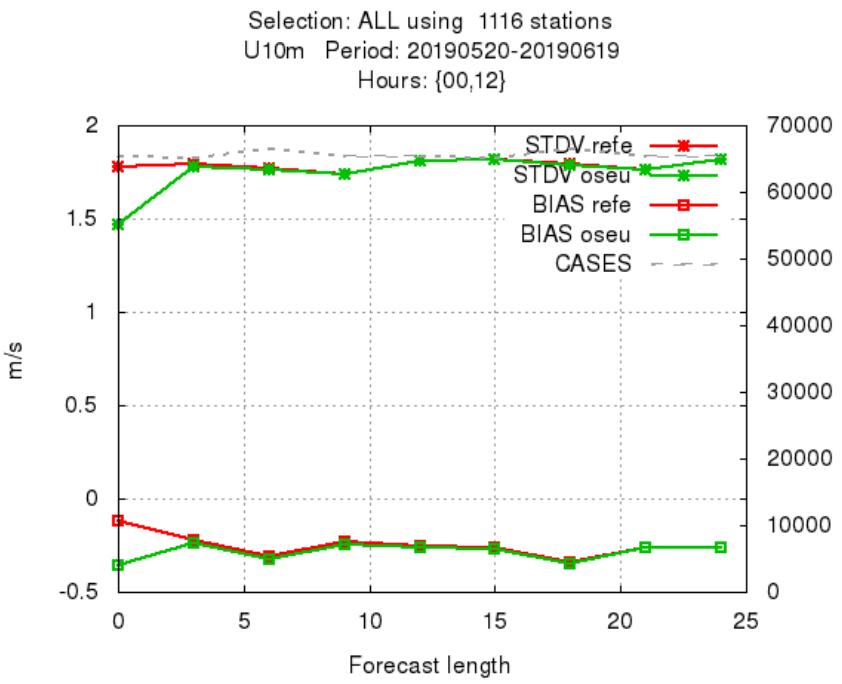




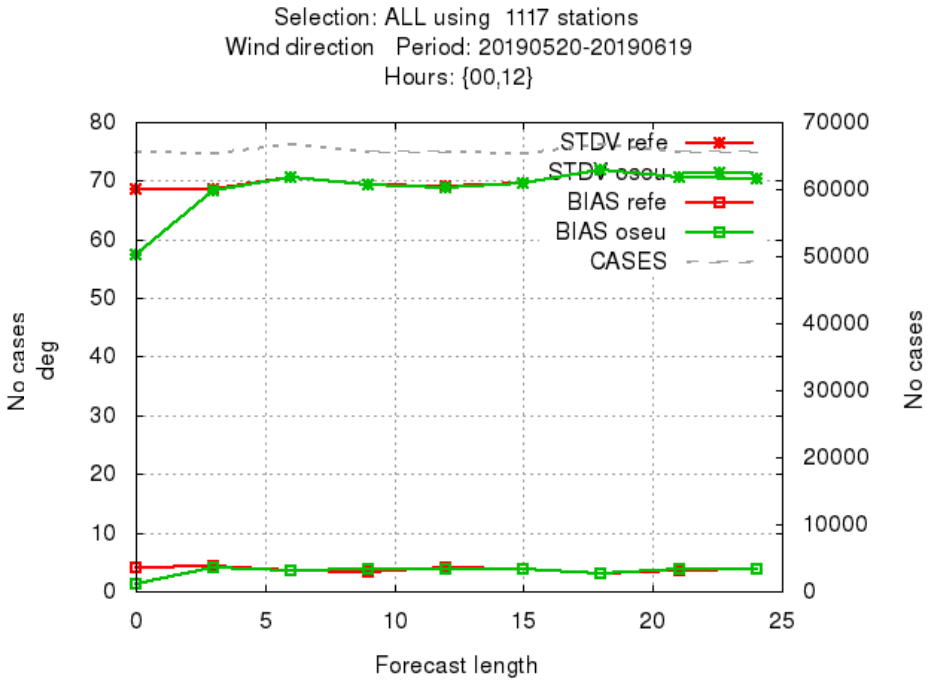
OSE - impact of 10 m wind assimilation over land

- EXP(10 m wind) and REF experiment (only T2m, RH2m) over 1 month.
- (Positive) impact is very short lived.

Wind speed

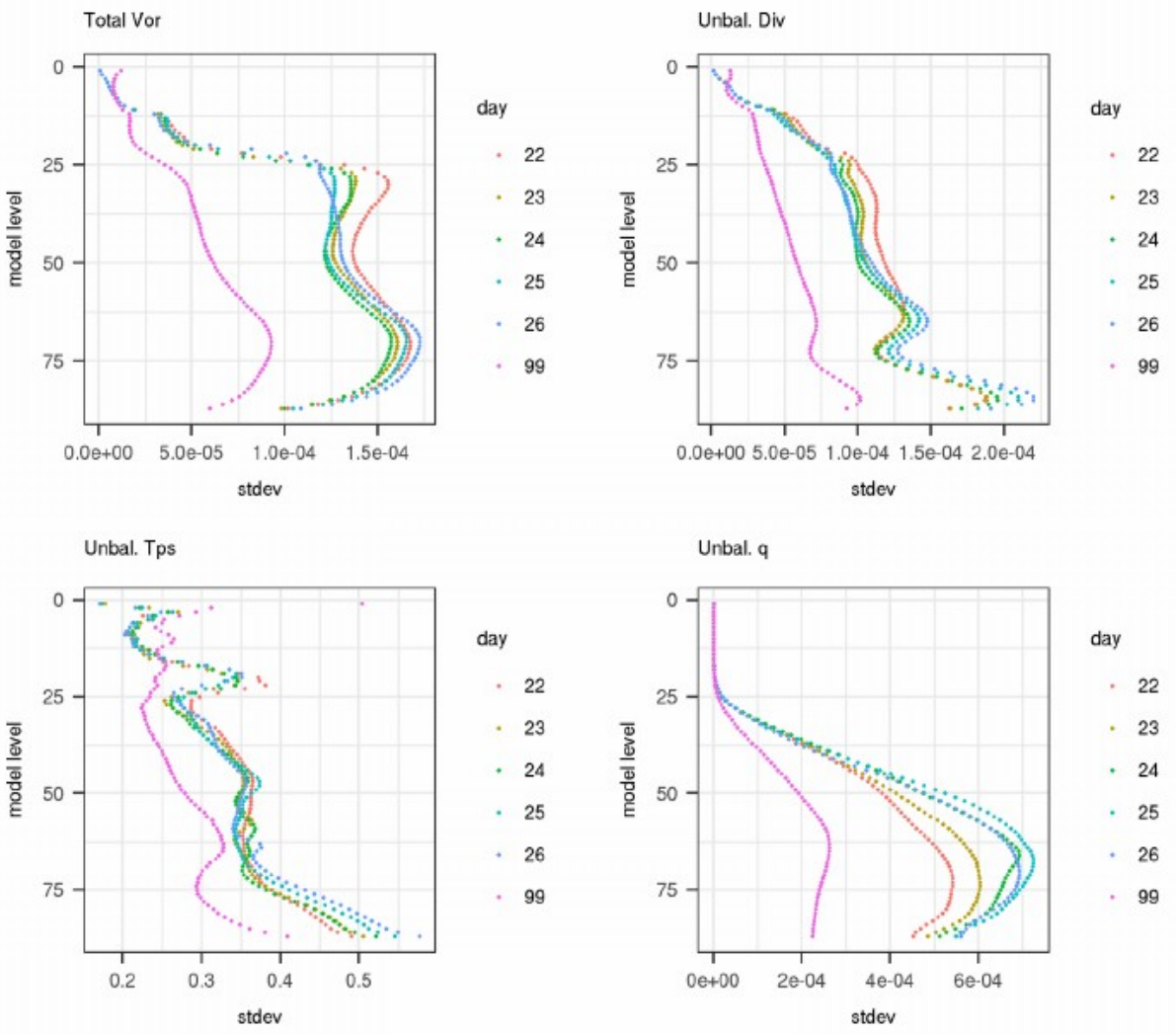


Wind direction



Experimentation with EDA

- 20-member ensemble at operational 4.4 km domain
- 3-hourly cycle
- B-matrix diagnosed over last 8 runs (daily)
- First runs show significant daily variability, esp. q



Summary and plans

- Upgrade to cy43 with mostly neutral scores
- GNSS data assimilation: results not yet convincing
- Radar data assimilation
  - Experiments with reflectivity to be continued
  - Local work on wind de-aliasing
- 1-hourly RUC – still not started because 1.3 km domain and configuration (integration) not yet ready (planned stay in November)
- Continuation of EDA experiments:
  - Impact study: comparison of daily B, static downscaled B (current operational) and mean EDA B-matrix